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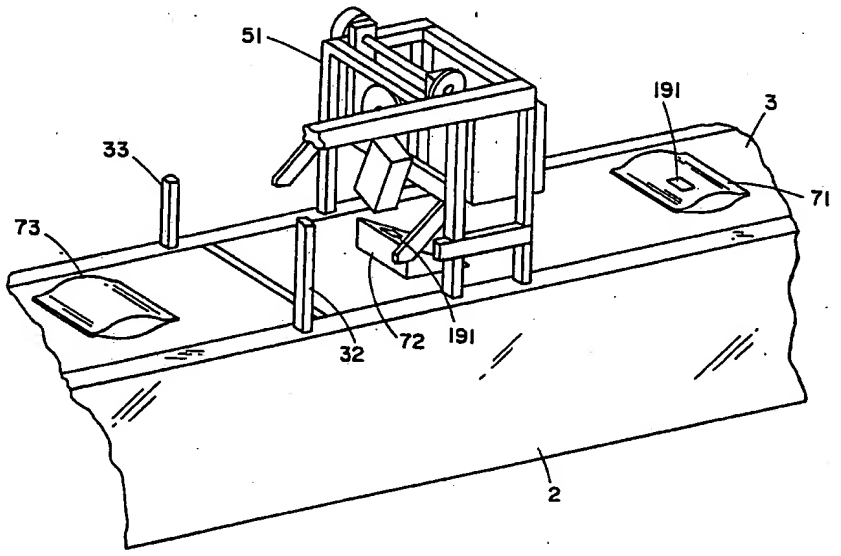

(57) Abstract

An improved package labeling apparatus of the type in which labeling information for a package (73) which is moving to a labeling station (51) is transmitted to the labeling station to control the application of the required label (191). The improvement comprises a carriage mounted printer-applicator assembly which responds to the labeling transmission, prints the label, moves to intercept the moving package and applies the label.

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MOVABLE LABEL PRINTER-APPLICATOR ASSEMBLY

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a movable label printer-applicator. More particularly, it relates to a label printer-applicator which is used in conjunction with a package conveyor system to print and apply labels to packages. Most particularly, the present application finds use in the application of bar coded shipping labels having one face coated with a pressure sensitive adhesive.

Description of the Prior Art

Label applicators for applying labels to conveyor borne packages while they are in motion are known in the shipping industry. Known applicator systems remove a printed label from its backing strip and retain it against an applicator grid until the article to be labeled reaches an appropriate position on the conveyor. At that point, a blast of gas, such as air, is used to transfer the label from the grid to the surface of the article.

A variation on the known systems is disclosed in U.S. Patent 4,255,220. This patent discloses a label applicator in which a label receiver is mounted for movement on a supporting structure. A printed label received from a label dispenser is releasably retained on the label receiver. This receiver moves from a retracted position to an extended position in close proximity to the article to be labeled. A blast of air is used to transfer the label to the package. The label receiver returns to the retracted or home position where it receives the next label from the label dispensing means and the sequence is repeated.

While the systems described above are dependable and satisfactory for many labeling operations they have several problems. First, packages have to be turned and aligned on the conveyor in order to pass under the fixed path. Second, the movable receiver had to travel from the extended position

to the retracted or home position in order to pick up another label for every package on the conveyor. Finally, these requirements effectively limit the speed with which packages can be conveyed past the labeling station.

SUMMARY OF THE INVENTION

The present invention provides an apparatus for labeling moving packages in which a carriage mounted, integrated printer-applicator head prints and applies the package label.

In the preferred application, labeling information is input for a package which is then placed on conveyor system for transport. Sensors check the package geometry or configuration and its location on the conveyor. An edge sensor signals when
the package has reached a predetermined position on the conveyor.

The package location and configuration data along with the labeling information are transmitted to a controller which receives and correlates the data. The controller produces a label control signal which is transmitted to the labeling station. Vertical and lateral drive motors position the carriage mounted, integrated printer-applicator assembly in response to the label control signal. The printer-applicator (P-A) assembly both prints and applies the required label to the package.

The controller stores the P-A assembly position so that the P-A assembly moves directly to the next desired position as the sequence described above is repeated. To avoid impacts with packages that have shifted or turned as they traveled along the conveyor, sensors are provided to signal the P-A assembly to translate vertically.

It is an object of this invention to provide a system that will quickly and accurately label moving packages.

It is an object of this invention to provide a label applicator which does not require that it return to a fixed home position between labels.

It is an object of this invention to provide a label applicator that moves vertically and laterally in a fixed plane normal to the direction of package movement.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a package labeling system incorporating the present invention.

Figure 2 is a perspective view of the labeling station assembly.

Figure 3 is a front elevation of the labeling station assembly.

Figure 4 is a side elevation of the labeling station assembly.

Figure 5 is a perspective of the printer-applicator assembly.

Figure 6 is an elevation of the printer-applicator assembly in the direction 6-6 on Figure 5.

Figure 7 is an elevation of the printer-applicator assembly in the direction 7-7 on Figure 5.

Figure 8 is a perspective view of a portion of the package labeling system which illustrates label application on a package.

Figure 9 is a flow diagram for package sensing and labeling in accordance with the preferred embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figure 1, there is shown a label applicator system 1 that has been mounted over a conveyor system 2. At the beginning of the conveyor system 2 there is an operator's station 4 having a key pad 5 which is used to input shipping information
for a given package. The package (not shown) is then placed on the conveyor belt 3 for transport through the label applicator system 1.

At the first station, 10 in Figure 1, a sensor array 11, shown in phantom, is located in the housing 14 which is supported by framework 12 and straddles the conveyor belt 3.

A primary controller 13 is located within the same housing 14. The sensor array 11 locates the leading and trailing edges of each package and transmits this data to the controller 13. The specific configuration of the sensor array 11 is not important to the present invention and there are a number of commercially available devices for this purpose. However, it is necessary to have some means of initial package identification.

At the second station 20, a lateral location sensor 21 checks the lateral location of the package on the conveyor 3 and transmits a signal to the primary controller 13. Located at the third station 30 is a package profile sensor 31. This sensor 31 is comprised of light curtain emitter 32 and light curtain receiver 33. The emitter 32 and receiver 33 are mounted on opposing sides of the conveyor belt 3 in alignment with each other. As the package passes between the emitter 32 and receiver 33, it is profiled and the data transmitted to the primary controller 13. In the preferred embodiment, the light curtain emitter 32 and receiver 33 are Part No's. XPS60018X and XPS60018R from Scientific Technologies, Inc., Corporate Headquarters, 31069 Genstar Road, Hayward, CA 94544.

At the fourth station 40, the sensor 41 detects the leading edge of the approaching package. This establishes the package's arrival at a predetermined point along the conveyor 3. The primary controller 13 receives and correlates the package location and configuration data, and transmits a printer control signal to the labeling station assembly 51.

Signals are transmitted through signal and transmission cables (not shown) which are housed in cable through 6 that runs between the housing 14 and the labeling station assembly 51. Lighting supports 7 and lights 8 straddle the conveyor belt 3 at regular intervals and support the cable through 6.

Figures 2, 3 and 4 show more detailed views of the labeling station assembly 51. Before describing the operation of the labeling station 52, it will be beneficial to describe the components which comprise the preferred assembly.

The assembly **51** is comprised of an open framework **63** which straddles the conveyor belt **3**. The framework **63** is comprised of four vertical frame members **133**, **134**, **135** and **136** which define the four corners of the framework support assembly **63**. The vertical frame members **133-136** are fixed in position on the sides of the conveyor **3** at **137**. The longitudinal frame members **139** and **140** are respectively affixed to the vertical frame members **133** and **134** at upper and lower positions. A second pair of longitudinal frame members **141** and **142** are affixed to the second pair of vertical frame members **136** and **137** in like fashion. Straddling the conveyor belt **3** are the cross members **144** and **145**. The cross member **144** connects the top vertical frame members **133** and **135**. The cross member **145** connects the tops of the vertical frame members **134** and **136**. An intermediate cross member **143** also connects the vertical frame members **133** and **135** at an intermediate position which is above the maximum expected package height.

As can be seen from the above, the framework **63** is essentially a box frame which straddles the conveyor **3**. While the specific construction is not important, it must be remembered that the frame **63** has to withstand rapid movement of the P-A assembly and must be sturdy enough to permit positive location of the P-A assembly over the conveyor **3**.

The linear actuators **146** and **147** are affixed to the respective longitudinal frame members **139** and **140**, and **141** and **142**, on either side of the conveyor and in front of the respective vertical frame member **133** and **135**. The linear actuator **172** is horizontally attached, via a pair of mounts **173**, to the vertical linear actuators **146** and **147**. In the preferred embodiment, the linear actuators **146**, **147** and **172** are Part No. 1251001 from Macron Dynamics, Inc., 405 Caredean Drive, Horsham, PA.

The carriage assembly **170**, rides on the horizontal linear actuator **172** and is moved across the conveyor **3** by the lateral direction drive motor **178**. Mounted on the lateral drive motor **178** is a rotary encoder or position sensor **179** which continually transmits the position of the carriage assembly **170** so it can be tracked by the secondary controller **160**. In

the preferred embodiment, the lateral drive motor **178** and the rotary encoder **179** are Part No. R34JENC-R2-NS-VS-00 from Pacific Scientific, Motor and Control Division, 4301 Kishwaukee Street, P.O. Box 106, Rockford, IL 61105-0106.

The horizontal linear actuator **172** and the carriage assembly **170** are raised and lowered on the vertical linear actuators **146** and **147** by the vertical drive motor **150** which is attached to the support assembly **63** by a motor support bracket **148**. The drive pulley **151** on the vertical drive motor is coupled to the shaft pulley **156** by belt **158**. This combination drives a transverse shaft **154** which engages the upper ends of vertical linear actuators **146** and **147**. Rotary encoder or position sensor **157** tracks the turning of the transverse shaft **154** for the secondary controller **160** which controls the vertical drive motor **150**. An electric brake **153** is attached to the opposing end of the transverse shaft as a safety feature. In the preferred embodiment, the vertical drive motor **150** and rotary encoder **157** are Pacific Scientific, Motor and Control Division, Part No. R65HENA-R2-NS-VS-00. The vertical drive brake **153** is Part No. 1-055-541-006BF from Rexnord, Stearns Division, 120 N. Broadway, Milwaukee, WI 53202.

The printer-applicator support bracket **174** is affixed to the carriage assembly and supports the printer-applicator assembly **200**. The printer controller **202**, Figure 4, is also attached to the carriage assembly **170**. Mounted on the printer-applicator support bracket **174** above the P-A assembly **200** are a label supply reel **184**, which supplies labels on a tape **190**, and a take up spool **185**. An external air supply line **164**, extends from pneumatic line filter **163** to the head assembly **200**. An external air supply is attached at connection **162**.

The following description will refer to Figures 5, 6 and 7 which are enlarged views of the P-A assembly **200**. Contained inside the P-A housing **205** is a print head **204**, which receives the labels on the tape **190**, prints them and delivers printed labels **191** to the label dispenser **207**. In the preferred embodiment, the printer **204** and the printer controller **202** are

Part No's. 4524S-USPS from Sato America, Inc., 2761 Marine Way, Mountain View, CA 94043. Attached to the P-A housing **205** above the dispenser **207** is a support bracket **210**. Depending from the support bracket **210** is a catch plate support **215** to which a catch plate **216** is pivotally mounted. An air cylinder **211**, with a clevis **212** attached to its lower end, is pivotally attached to the catch plate **216** with pin **213**. At its upper end, the air cylinder **211** is pivotally attached to the support bracket **210**. An air supply line **220** supplies the air nozzle **221** which depends from the support bracket **210** over the label dispenser **207**. Look-down sensor **222** and photo eye **224** are also mounted below the support bracket **210**.

Articulated cable carriers **188** and **189**, see Figures 3 and 4, route cables and air lines (not shown) between the controller **160** and the P-A assembly **200**.

The printer control signal generated from the package configuration and location data is transmitted to the secondary controller **160** at the labeling station **50**. This secondary controller **160** controls vertical drive motor **150** and lateral drive motor **178** to reposition the carriage assembly **170**. In the preferred embodiment, the printer-applicator head assembly **200** is located one-half to one and one-half inches above the package surface. The look-down sensor **222** confirms the P-A assembly position. The primary controller **13** commands, through the printer controller **202**, the print head **204** to print a shipping label based on the shipping data. With the preferred assembly, the printing can be done on the move, since a home base location is not needed, and the label can be applied almost simultaneously upon package arrival. The labeling dispenser **207** peels the label **191** off its backing **192**, and a blast from air nozzle **221** blows the label onto the package. The package then proceeds under foam roller assembly **186** which rolls over the label to ensure that it is firmly seated on the package.

Strike sensors **180** are mounted on the support brackets **182** to confirm that the arriving package has not tipped or shifted into a position that will cause it to strike the P-A assembly

200. If a package has shifted, the strike sensors signal the secondary controller to raise the P-A assembly 200 to avoid possible damage to the assembly and/or the package.

If for any reason a label 191 cannot be applied to a package, such as strike sensors 180 indicating that the package has exceeded the height limitation, the controller 13 activates the air cylinder 211 to swing the catch plate 216 into position under the label dispenser 207. The label 191 is then blown onto the catch plate 216. If the catch plate 216 is full, photo eye 224 signals the controller that operator assistance is required.

Because the P-A assembly 200 can both print and apply a shipping label, it is not necessary to have the P-A assembly 200 return to a retracted or home position before printing and applying a label to the next package on the conveyor 3. The P-A assembly 200 proceeds directly from its last position to the next desired position based on the location and configuration data collected for the next package on the conveyor. In the preferred embodiment, the P-A assembly prints the label as it travels to the next desired position.

The P-A assembly 200 utilizes labels 191 as described in U.S. Patent No. 4,724,166. The label 191 can be peeled away from the clear adhesive layer that affixes it to the package without damage to or obstruction of any information which may be under the label. This makes the label position on the package inconsequential to other information on the package surface. Once the package has reached its destination, the label 191 can be removed, leaving only its clear adhesive layer behind.

Referring to Figure 8, there is shown a portion of the conveyor system 2 and the labeling station assembly 51. Three packages are shown on the conveyor belt 3. These packages represent some of the types of packages that have been successfully labeled with the present invention. The first package 71 is an unevenly profiled soft pack envelope which simulates a sweater. It is shown on the conveyor belt 3 at a position past the labeling station assembly 51 with a bar code printed label 191 successfully applied. A second package

72, shown at the labeling station 51 under the P-A assembly 200 is a triangular prism with the label 191 applied. A third package 73 is shown between light curtain emitter 32 and receiver 33. The third package 173 is an over stuffed soft pack envelope. In the current embodiment, maximum package size is limited to 18 inches high and the 24 inch conveyor width. However, other configurations are possible. Due to the present package identification and tracking system, the label applicator assembly is sensitive to package geometry and location. Thus, each package is treated individually without the need for the P-A assembly 200 to return to some fixed home base. These features combine to provide both increased speed and increased flexibility.

In the preferred embodiment, the conveyor system 2 is made up of a series of individually controllable belt segments which operate at speeds that increase along the conveyor from 240 to 400 feet per minute at the P-A assembly 200. The primary controller 13 regulates the flow of packages through the system 1 based on the time required for inputting of labeling information as well as its completeness, the translation and print time required by the P-A assembly, and the position of other packages preceding the current package on the conveyor.

Figure 9 shows a information flow diagram for the preferred embodiment of the disclosed labeling apparatus system. By way of explanation, the diagram shows the operations performed in respect to the package flow along the conveyor path. It will be understood by those skilled in the art that some operations may occur simultaneously and that the sequence of events is not limited to this example. Box 5 shows the entry of labeling data and a secondary operation, designated box 5.1, shows the package being placed on the conveyor. Boxes 10, 20, 30 and 40 show the various package configuration and position detecting operations that occur at stations 10, 20, 30 and 40 respectively as previously discussed. The position and configuration data is transmitted to the primary controller 13, shown in box 70. The secondary controller 160 and the printer controller 202 are also shown

in box 70 with the primary controller and are referred to collectively. The controller receives the package location and configuration data, correlates it and determines the required translation for the P-A assembly 200 to intercept the package. As the package proceeds to the labeling station 50, a strike sensor shown in box 50.1 checks that the package does not exceed maximum height and/or position requirements. If there is a problem, the sensor results in a signal to the controller box 70 which moves the P-A assembly to a maximum height, stops the conveyor to avoid a collision and activates the label catch plate to remove the unused label. If the package does not exceed maximum height, the controller signals the P-A assembly 200, as shown in box 50.2, to label the package as it proceeds down the conveyor.

As will be appreciated by those skilled in the art, the present label printer-applicator apparatus allows for faster processing of packages than those label applicators previously known.

* * * * *

CLAIMS

I claim:

1. An improved package labeling apparatus of the type in which labeling information for a package which is moving to a labeling station is transmitted to the labeling station to control the application of the required label, wherein the improvement comprises:

a carriage mounted printer-applicator assembly which responds to the labeling transmission, prints the label, moves to intercept the moving package and applies the label.

2. A package labeling system of the type in which labeling information is input into a controller for a package which is transported on a conveyor to a labeling station which applies the required label, wherein the improvement comprises:

means to determine the package configuration and its position on the conveyor, and to transmit that information to the controller;

means within the controller which coordinates the labeling and package information and outputs a label information signal; and

a carriage mounted printer-applicator assembly which responds to the label information signal, prints the label, moves to intercept the package and applies the label.

3. The system of claim 2, wherein the carriage mounted printer-applicator assembly moves both vertically and laterally in a fixed plane normal to the conveyor path.

4. The system of claim 3, wherein linear actuators move the carriage mounted printer-applicator assembly into position to intercept the package.

5. The system of claim 2, wherein the carriage mounted printer-applicator assembly prints the package label as it moves into position to intercept the package.

6. The system of claim 2, wherein a label supply reel, mounted on the carriage assembly, supplies blank labels to the printer-applicator assembly and a take-up spool, mounted on the carriage assembly, collects the spent backing ribbon.

7. The system of claim 2, wherein a rotary encoded drive motor powers the vertically mounted linear actuators and a rotary encoded drive motor powers the horizontally mounted linear actuator; the encoded motors provide tracking data to the controller which receives and correlates the data, and outputs control signals to accurately position the printer-applicator assembly.

8. The system of claim 2, wherein the printer-applicator assembly moves to intercept successive packages without returning to a home base.

9. The system of claim 8, wherein the printer-applicator intercepts the package at a predetermined point based on the package configuration, conveyor speed, and a leading edge of the package.

10. The system of claim 2, wherein strike sensors are mounted in front of the printer-applicator assembly to detect if a package position will strike it and upon detection of such a package to transmit a signal to the controller which raises the printer-applicator assembly and stops the conveyor.

11. The system of claim 2, wherein a catch plate on the printer-applicator assembly is actuated by the controller to intercept any label which cannot be properly applied to the package.

12. A method for operating a package labeling system which comprises:

(1) providing a package conveyor system with a means for inputting data, a plurality of package geometry and location sensors, a controller, a motor driven, carriage

mounted, integrated label printer-applicator assembly along the conveyor path, and labels;

(2) inputting labeling data for a package on the conveyor;

(3) transmitting the labeling data to the controller;

(4) sensing the package geometry and position on the conveyor;

(5) transmitting the package geometry and position data to the controller;

(6) correlating the package geometry and position data with the labeling data;

(7) transmitting a label information signal to the printer-applicator;

(8) moving the printer-applicator assembly to intercept the package without returning to a home base; and

(9) printing and applying a label in accordance with the label information signal;

13. The method according to claim 12 wherein the printer-applicator assembly is further provided with both vertically and horizontally movement in a fixed plane normal to the conveyor path.

14. The method according to claim 12 wherein the steps of moving the printer-applicator assembly and printing the label are done concurrently.

15. The method according to claim 12 further comprising:

providing a vertical drive means with an associated rotary encoder and a horizontal drive means with an associated rotary encoder for movement of the printer-applicator assembly;

tracking the printer-applicator assembly position with the rotary encoders;

transmitting position data to the controller;

correlating position data in the controller; and

controlling the vertical and horizontal position of the printer-applicator assembly based on the position data.

16. The method according to claim 12 further comprising:

providing a catch plate associated with the printer-applicator assembly; and

actuating the catch plate to intercept any label which cannot be properly applied to the package.

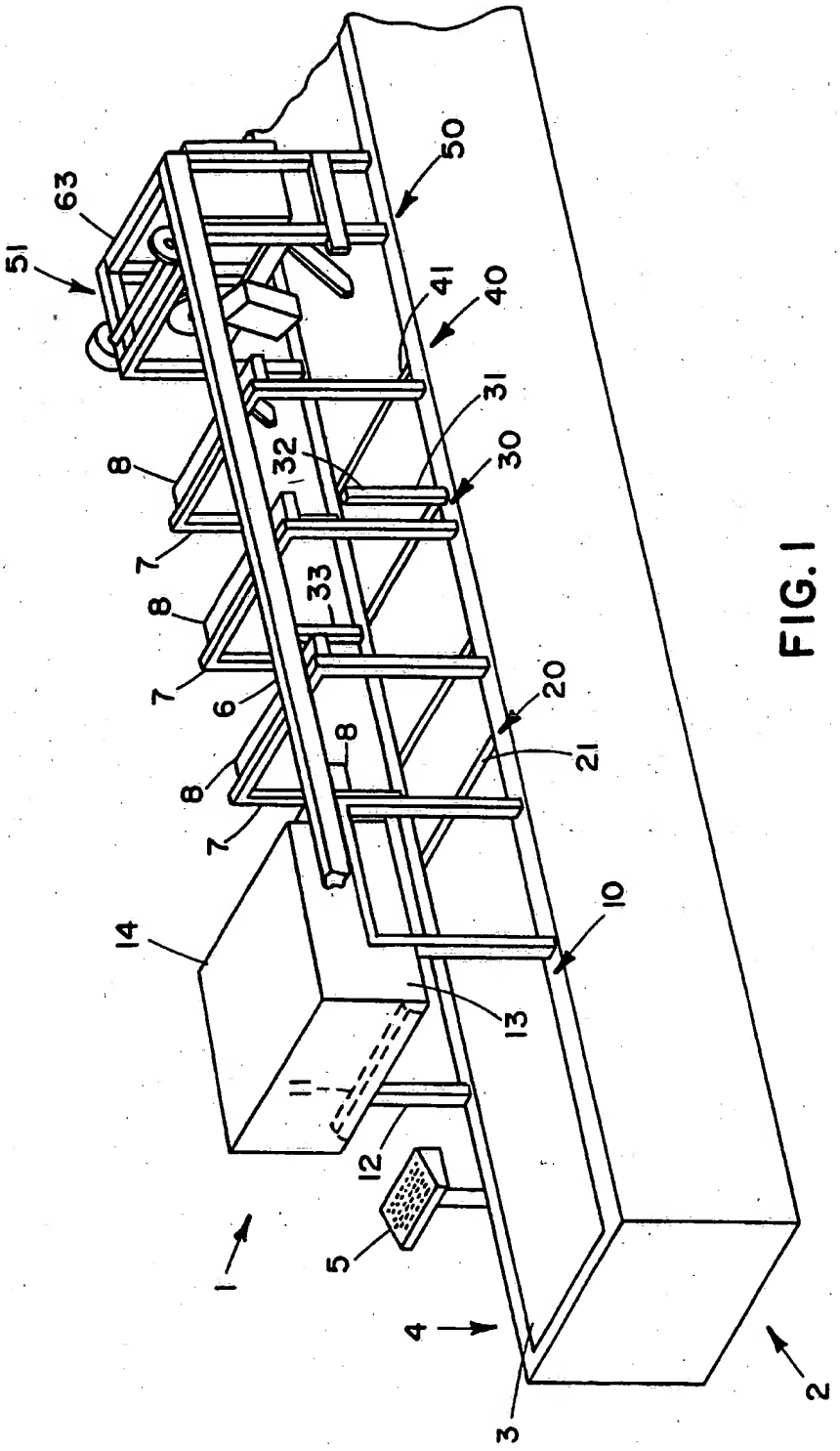

FIG. 1

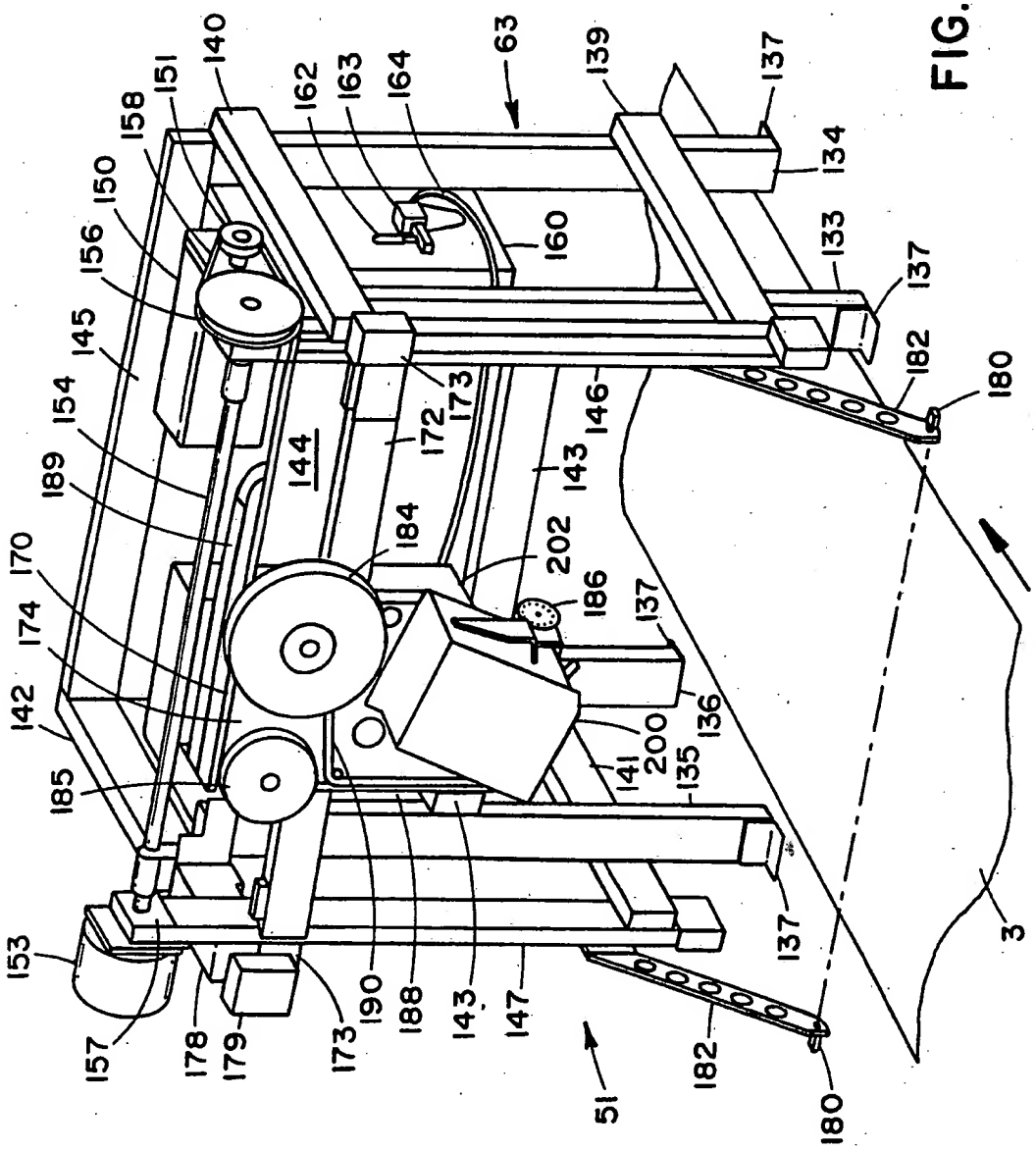
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FIG. 2

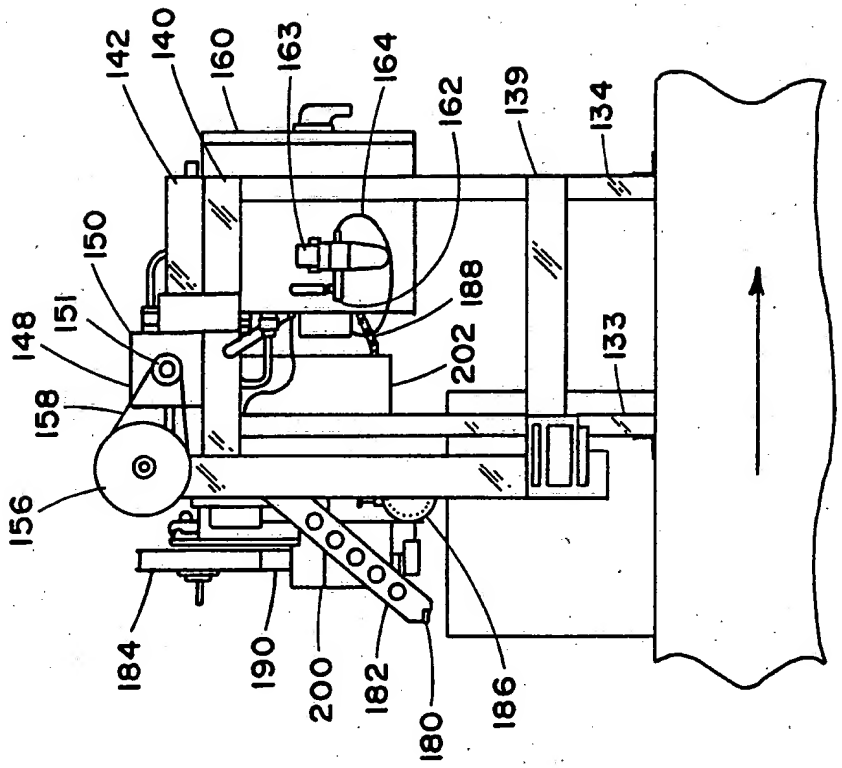
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FIG. 4

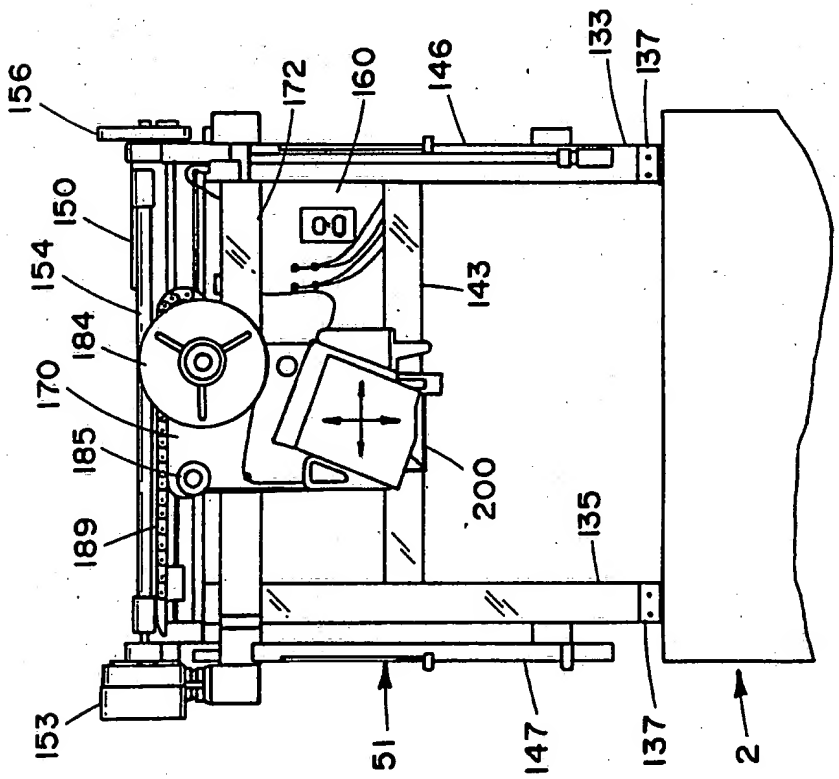
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FIG. 3

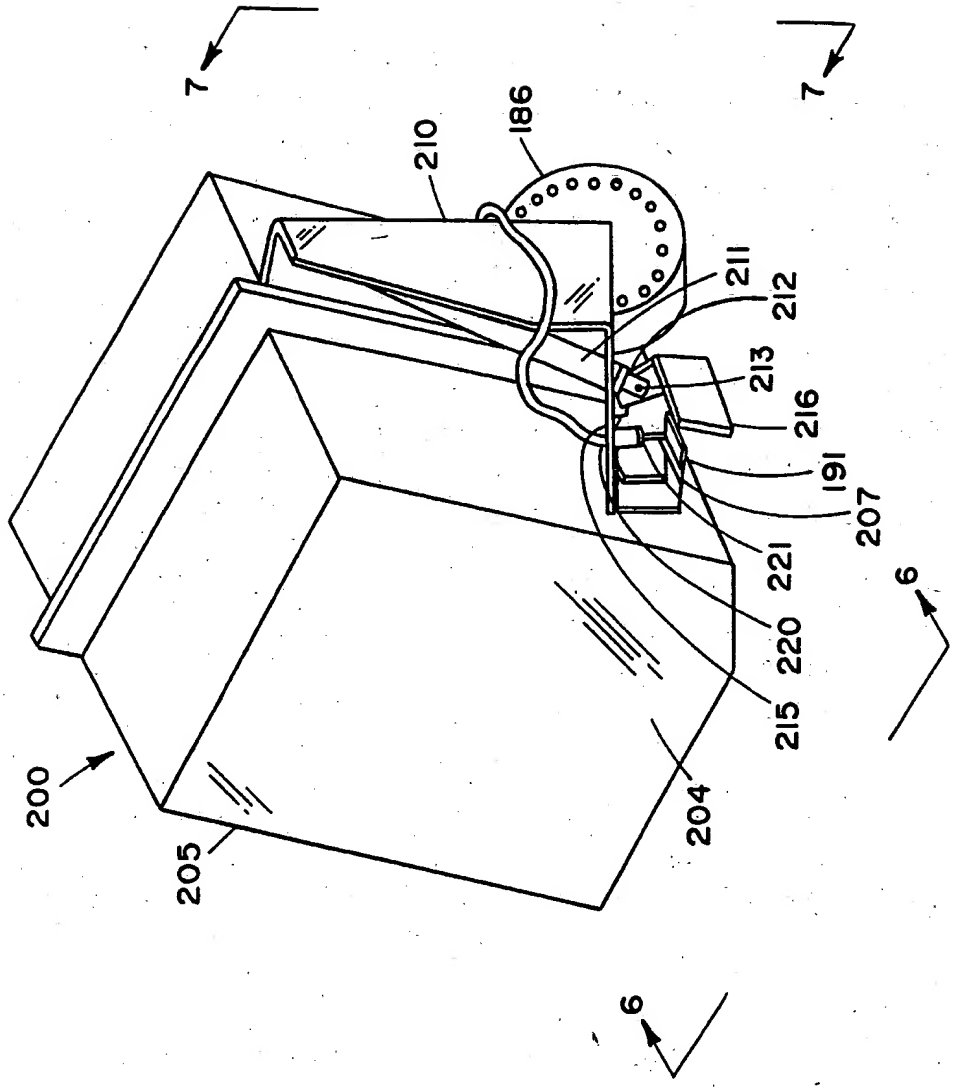

FIG.5

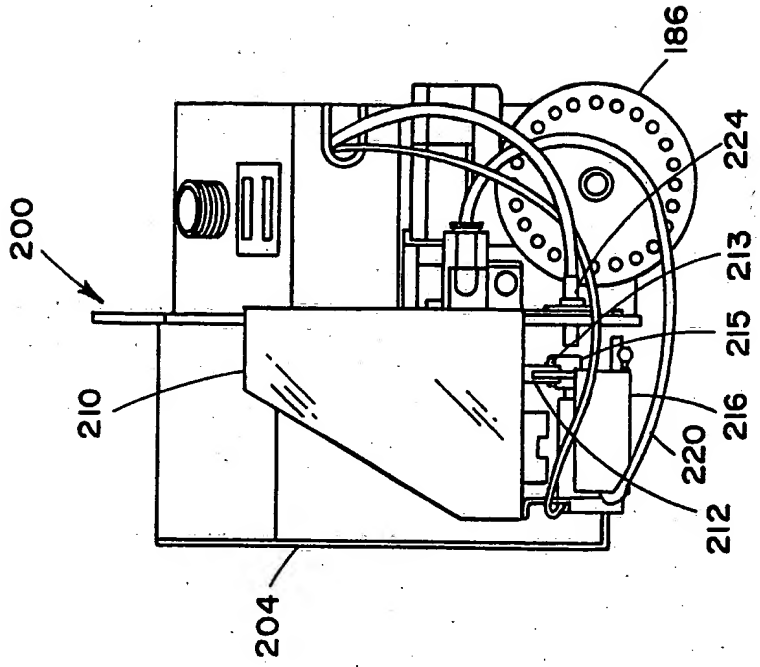
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FIG. 7

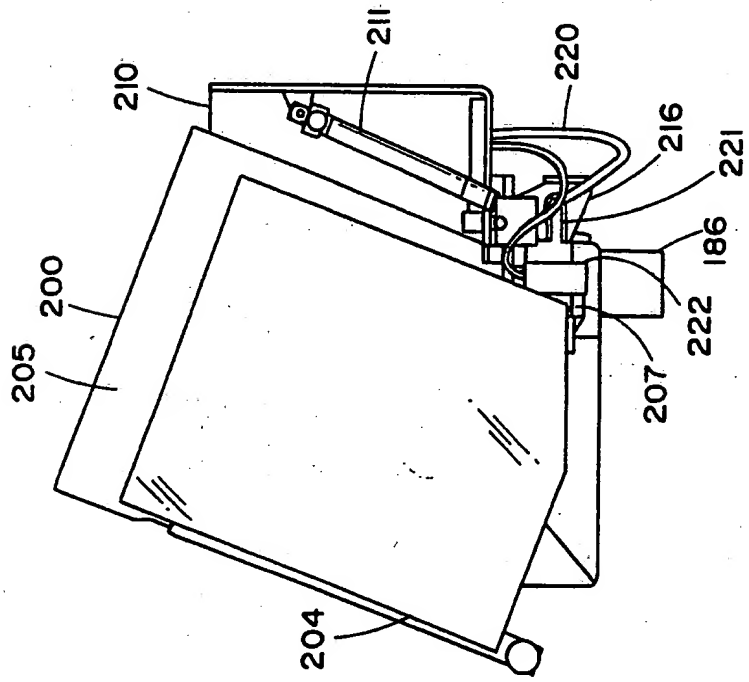
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FIG. 6

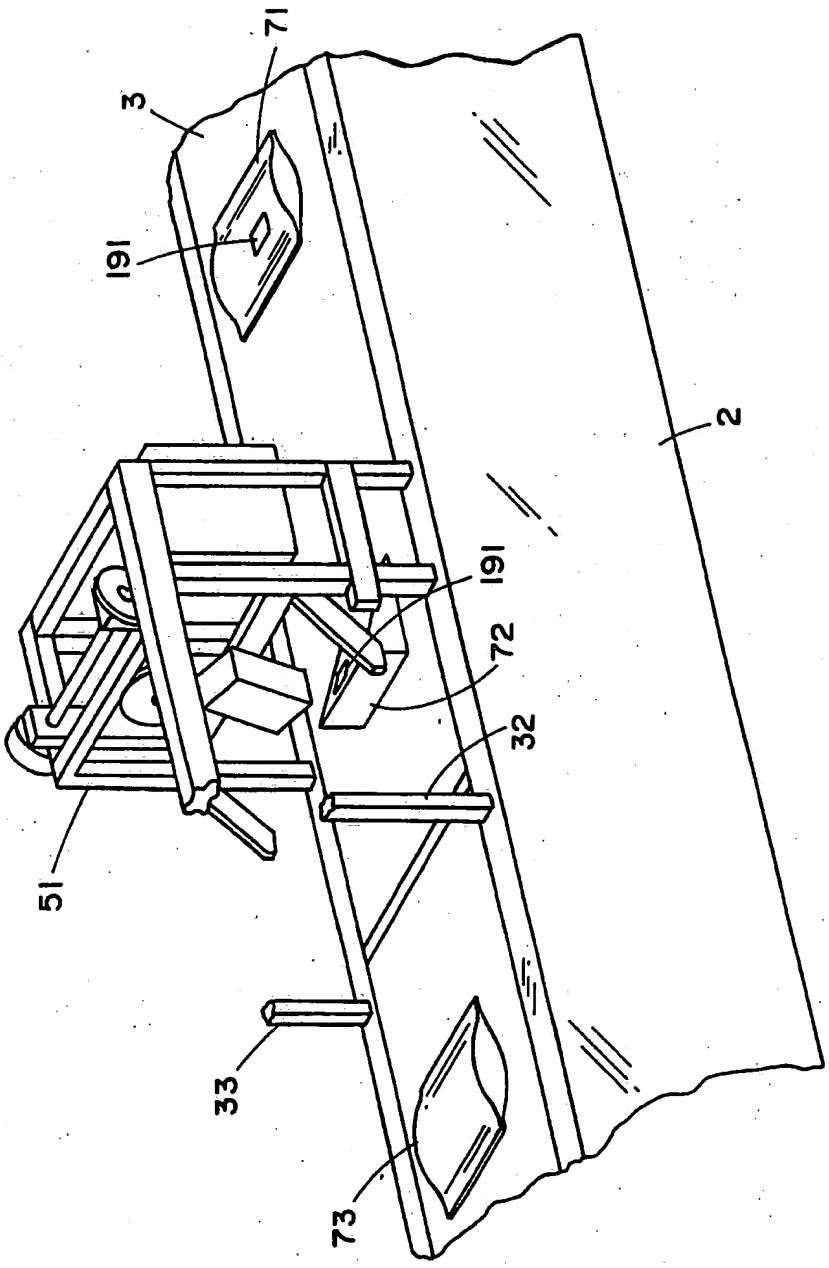

FIG. 8

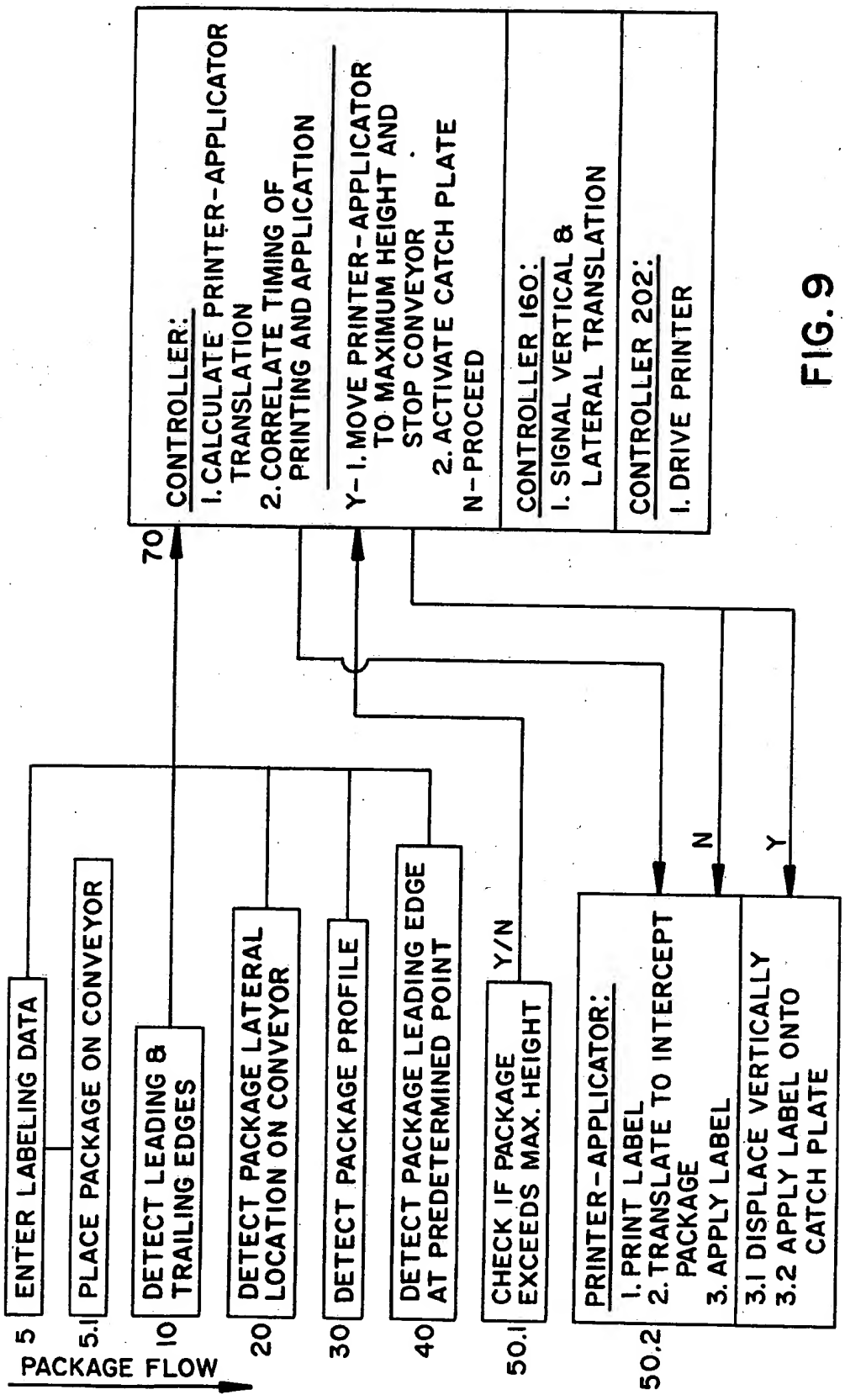
CONTROLLER:
1. CALCULATE PRINTER-APPLICATOR TRANSLATION
2. CORRELATE TIMING OF PRINTING AND APPLICATION
Y- 1. MOVE PRINTER-APPLICATOR TO MAXIMUM HEIGHT AND STOP CONVEYOR
2. ACTIVATE CATCH PLATE
N- PROCEED
70
CONTROLLER 160:
1. SIGNAL VERTICAL & LATERAL TRANSLATION
CONTROLLER 202:
1. DRIVE PRINTER
ENTER LABELING DATA
5
PLACE PACKAGE ON CONVEYOR
5.1
DETECT LEADING & TRAILING EDGES
10
DETECT PACKAGE LATERAL LOCATION ON CONVEYOR
20
DETECT PACKAGE PROFILE
30
DETECT PACKAGE LEADING EDGE AT PREDETERMINED POINT
40
CHECK IF PACKAGE EXCEEDS MAX. HEIGHT
Y/N
50.1
PRINTER-APPLICATOR:
1. PRINT LABEL
2. TRANSLATE TO INTERCEPT PACKAGE
3. APPLY LABEL
50.2
N
Y
3.1 DISPLACE VERTICALLY
3.2 APPLY LABEL ONTO CATCH PLATE
PACKAGE FLOW

FIG. 9

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 93/04556

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B65C9/42; B65C1/02

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	B65C

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
X Y	US,A,4 615 757 (TREIBER) 7 October 1986 see column 4, line 32 - line 45 see column 8, line 48 - column 9, line 50 see column 10, line 12 - line 25 see figures 2-6	1,2,5,6, 8,12,14 3,4,13
Y	GB,A,2 076 549 (TERAOKA SEIKOSHO CO. LTD.) 2 December 1981 see page 3, line 94 - line 127 see page 10, line 39 - page 11, line 74 see figures 5,14-17	3,4,13
A	DE,U,8 803 034 (KLINGER) 5 May 1988 see claims 1,2; figures	1,10

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° Special categories of cited documents : [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
23 AUGUST 1993	13. 09. 93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT FFICE	MARTINEZ NAVAR

Form PCT/ISA/210 (second sheet) (January 1985)

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	EP,A,0 460 281 (APPAREL TECHNOLOGY SYSTEMS, INC.) 11 December 1991 see abstract; figure 1	1,2,12

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

US 9304556
SA 74455

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-4615757	07-10-86	CA-A-	1267868	17-04-90
		EP-A-	0211520	25-02-87
GB-A-2076549	02-12-81	JP-A-	56123232	28-09-81
		JP-A-	57077433	14-05-82
		JP-A-	57077435	14-05-82
		JP-A-	57077431	14-05-82
		DE-A,C	3106494	14-01-82
		DE-C-	3153352	24-01-91
		DE-C-	3153353	28-09-89
		FR-A,B	2488400	12-02-82
		SE-B-	446226	18-08-86
		SE-A-	8101073	27-08-81
		US-A-	4415048	15-11-83
DE-U-8803034	05-05-88	None		
EP-A-0460281	11-12-91	AU-B-	621514	12-03-92
		AU-A-	6462090	19-12-91
		CA-A-	2035770	07-12-91
		CN-A-	1057076	18-12-91
		JP-A-	4044941	14-02-92
		US-A-	5230765	27-07-93

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82